

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently Amended) An external fixation apparatus comprising:
~~a first member attachable to a first bone segment through a pin;~~
~~a lockable ball joint connected to the first member;~~
~~a pivot arm connected to the first member through the lockable ball joint, the pivot arm comprising: a first end portion and a second end portion, wherein the first end portion and the second end portion are configured to translate transversely relative to one another and to a longitudinal axis of the pivot arm; and~~
an upper portion with a ball end and a second opposite end having a first recess formed therein;
a lower portion with a prong end and a second opposite end having a recess formed therein, wherein the lower portion and upper portion are secured together with the first and second recesses adjacent one another to form an internal recess in the pivot arm;
a carriage within the internal recess such that a position of one of the upper and lower portions of the pivot arm with respect to a longitudinal axis of the pivot arm is adjusted when the carriage is moved; and
~~a pin clamp coupled to and rotatable about the prong end second end portion of the pivot arm through a lockable joint, the pin clamp being attachable to a second bone segment.~~

Claim 2 (cancelled)

3. (Currently Amended) The external fixation apparatus of claim 1, wherein the carriage is positioned entirely within the internal recess and is externally accessible from the upper portion of the pivot arm for fine adjustment in one axis with respect to the longitudinal axis of the pivot arm and from the lower portion for fine adjustment in a second axis with respect to the longitudinal axis of the pivot arm that is isolated from the first axis ~~translation of the first and second end portions relative to the longitudinal axis of the pivot arm is possible in at least two dimensions.~~

4. (Currently Amended) The external fixation apparatus of claim 1, wherein the pivot arm further comprises ~~includes:~~

~~an upper recess and a lower recess;~~

~~a carriage that fits within the upper recess and the lower recess; a worm gear received in each of two threaded holes in the carriage including two threaded holes each receiving a worm gear; and~~

keybolts that operate each worm gear such that the carriage may be moved transversely to the longitudinal axis in one dimension within the upper recess and transversely to the longitudinal axis in another dimension within the lower recess.

5. (Currently Amended) The external fixation apparatus of claim 1, wherein the prong end of the lower portion of the pivot arm has only a single prong ~~at the second end portion~~.

Claims 6-16 (cancelled)

17. (Original) The external fixation apparatus of claim 1, wherein the pin clamp is symmetrical or asymmetrical.

18. (Currently Amended) An external fixation apparatus comprising:
~~a first member attachable to a first bone segment through a pin;~~
~~a lockable ball joint connected to the first member;~~
~~a pivot arm connected to the first member through the lockable ball joint, the~~
~~pivot arm~~ comprising a first end portion and a second end portion, the second end portion comprising a shaft with a free end extending transversely from and maintaining a fixed spatial relationship with the second end portion of the pivot arm, the shaft comprising ~~therefrom~~ with a groove extending substantially around a circumference of the shaft, and wherein the first and second end portions are configured to translate transversely relative to one another and to a longitudinal axis of the pivot arm; and
a pin clamp attachable to a ~~second~~ bone segment and releasably attachable ~~snap-fit~~ to and rotatable about the shaft extending from the pivot arm, the pin clamp comprising:

a first jaw and a second jaw, the first jaw including a hole that receives the shaft; and

a locator pin positioned within the first jaw such that the locator pin is externally accessible for manual manipulation during use of the pin clamp via a pushbutton coupled to an end of the locator pin or an enlarged knob on an end of the locator pin, wherein the locator pin that is received within the groove of the shaft when the pivot arm and the pin clamp are coupled and removed from the groove to disengage the pin clamp from the pivot arm.

19. (Previously Presented) The external fixation apparatus of claim 18, further comprising a first bolt that passes through openings in the first and second jaws such that tightening of the first bolt interferes with the shaft and locks rotation of the pin clamp about the pivot arm.

20. (Previously Presented) The external fixation apparatus of claim 18, wherein translation of the first and second end portions is possible in at least two dimensions and the pivot arm further comprises:

an upper recess and a lower recess;

a carriage that fits within the upper recess and the lower recess of the pin clamp, the carriage including two threaded holes each receiving a worm gear; and

keybolts that operate each worm gear such that the carriage moves transversely relative to the longitudinal axis in one dimension within the upper recess and transversely relative to the longitudinal axis in another dimension within the lower recess.

21. (Previously Presented) The external fixation apparatus of claim 18, wherein the locator pin is pulled to allow for release of the pivot arm from the pin clamp.

Claim 22 (cancelled)

23. (Previously Presented) The external fixation apparatus of claim 19, wherein the pin clamp further comprises second and third bolts that hold the first and second jaws together and attach and clamp pins or wires to the second bone segment.

24. (Original) The external fixation apparatus of claim 23, wherein the pin clamp further comprises openings in the first and second jaws that receive biasing elements and threaded ends of the second and third bolts.

25. (Currently Amended) An external fixation system for attaching pins or wires to at least one bone segment, the system comprising:

a first member;

a second member coupled to the first member, the second member comprising a shaft that extends transversely from an end portion of the second member and has a groove extending substantially around a circumference of the shaft; and

a pin clamp attachable to and detachable from ~~snap-fit onto~~ the shaft of the second member, the pin clamp comprising:

a first jaw and a second jaw;

a hole in the first jaw configured to receive the shaft; and

a push or pull mechanism that is positioned within the first jaw and is externally accessible for manual manipulation during use of the pin clamp, the push or pull mechanism comprising a locator pin that is received within the groove of the shaft when the ~~pivot-arm~~ second member and the pin clamp are coupled and removed from the groove to disengage the pin clamp from the ~~pivot-arm~~ second member.

Claims 26-27 (cancelled)

28. (Previously Presented) The system of claim 25, wherein the second member has at least one other end portion and the end portions may be translated transversely relative to a longitudinal axis of the second member in at least two dimensions.

29. (Currently Amended) The system of claim 25, wherein the locator pin is ~~pushed or pulled~~ manually by the user to allow for release of the shaft from the pin clamp.

30. (Currently Amended) A method of treating a skeletal condition or injury using an external fixation apparatus, the method comprising:

(a) fixing a first member to a first side of a fracture with upper bone pins;
(b) fixing a pin clamp to a second side of the fracture with lower bone pins;
(c) providing a pivot arm comprising an upper portion with a ball end and a second end opposite the ball end with a first recess formed in the second end and a lower portion with a prong end and a second end opposite the prong end with a second recess formed in the second end, where the upper and lower portions are secured together with the first and second recesses adjacent one another to form an internal recess in the pivot arm;

(d) coupling the pin clamp to the first member through the use of a pivot arm, wherein the lower portion of the pivot arm is coupled directly to the pin clamp; and having first and second end portions, the first member being coupled to the first end portion through a lockable ball joint and the pin clamp being coupled to the second end portion through a second lockable joint; and

(e) moving a carriage that is within the internal recess of the pivot arm to adjust a position of one of the upper and lower portions of the pivot arm with respect to a longitudinal axis of the pivot arm.

~~(d) — adjusting the first and second end portions of the pivot arm relative to each other and transversely relative to a longitudinal axis of the pivot arm to precisely reduce the fracture.~~

31. (Previously Presented) The method of claim 30, further comprising rotating the pin clamp as desired for placement of the lower bone pins.

32. (Original) The method of claim 30, wherein the pin clamp is fixed prior to the fixing of the first member.

33. (Currently Amended) The method of claim 30, wherein (e) further comprises moving the carriage to cause both (i) the upper portion of the pivot arm to move in one axis with respect to the longitudinal axis of the pivot arm and (ii) the lower portion of the pivot arm to move in a second axis with respect to the longitudinal axis of the pivot arm that is isolated from the first axis ~~wherein the first and second end portions are adjusted transversely relative to the longitudinal axis of the pivot arm in at least two degrees of freedom.~~

34. (Currently Amended) The apparatus of claim 1, wherein the pin clamp further comprises a push/pull mechanism having at least one end externally accessible during use for releasably coupling the pin clamp ~~is releasably coupled to the pivot arm using a push/pull mechanism.~~

Claims 35-41 (cancelled)

42. (Previously Presented) The system of claim 25, wherein the pin clamp further comprises:

openings in each of the first and second jaws; and

biasing elements received within the openings, the biasing elements adapted to bias the first and second jaws toward each other.

43. (Previously Presented) The system of claim 42, wherein the pin clamp further comprises first and second bolts that extend into the openings in the first and second jaws, the first and second bolts configured to compress the biasing elements and hold the first and second jaws together.

44. (New) The system of claim 25, wherein the locator pin further comprises an enlarged knob end that is manually pulled to remove an opposite end of the locator pin from the groove of the shaft.

45. (New) The system of claim 25, wherein the push or pull mechanism further comprises a biasing element that surrounds a portion of the locator pin.

46. (New) The system of claim 25, wherein the pull or pull mechanism further comprises a button to which a first end of the locator pin is connected such that a second opposite end of the locator pin moves out of the groove of the shaft when the button is manually depressed.

47. (New) The system of claim 25, wherein the locator pin is biased by a spring into a position to interfere with the groove of the shaft when the shaft is inserted into the hole of the first jaw.

48. (New) The system of claim 25, wherein the pin clamp snap fits onto the shaft of the second member.